

What is claimed is:

1. A dispersion comprising polymer particles dispersed in a dispersion medium, wherein said polymer particles each contain greater than 2 living radicals in each polymer particle, and wherein said living radicals are not chemically protected or capped.
2. The dispersion of claim 1 wherein said polymer particles each contain on average greater than 3 living radicals in each polymer particle.
3. The dispersion of claim 2 wherein said polymer particles each contain on average greater than 5 living radicals in each polymer particle.
4. The dispersion of claim 3 wherein said polymer particles each contain on average greater than 20 living radicals in each polymer particle.
5. The dispersion of claim 4 wherein said polymer particles each contain on average greater than 100 living radicals in each polymer particle.
6. The dispersion of claim 5 wherein said polymer particles each contain on average greater than 1000 living radicals in each polymer particle.
7. The dispersion of claim 1 wherein said polymer particles have an average particle size of from 10 to 5000 nanometers.
8. The dispersion of claim 7 wherein said polymer particles have an average particle size of from 10 to 500 nanometers.
9. The dispersion of claim 8 wherein said polymer particles have an average particle size of from 20 to 150 nanometers.
10. The dispersion of claim 1 wherein said polymer particles have a unimodal particle size distribution.
11. The dispersion of claim 1 wherein said dispersion medium comprises water.
12. A free radical precipitation polymerization process comprising
  - a) combining at least one monomer in at least one solvent;
  - b) dispersing said monomer solvent mixture in a dispersing medium that is non-miscible with the first solvent, using a surfactant, stabilizer, or mixture thereof;
  - c) initiating polymerization with at least one free-radical generating agent and conversion, to produce polymer particles containing radicals trapped by precipitation by virtue of being

above the lower critical solution temperature of the system; and

d) Controlling the rate of reaction of the radicals by controlling the reactor conditions including, but not limited to, temperature, pressure, and composition.

e) removing the precipitating agent either during or after free-radical generation to form a

5 dispersion polymer in the dispersing medium having living, trapped radicals.

13. The process of claim 12 wherein said dispersing medium is water.

14. The process of claim 12 wherein said free radical generating agent is a water-soluble initiator.

15. The process of claim 12 further comprising adding, following step (e), at least one additional monomer to said dispersion polymer having living, trapped radicals.

10 16. The process of claim 15 wherein the additional monomer comprises the same monomer as in the first stage polymerization.

17. The process of claim 15 wherein the additional monomer comprises at least one monomer which is different than the first stage monomer, resulting in a block copolymer.

18. The process of claim 12 wherein said solvent (a) is a mixed solvent system.

15 19. The process of claim 12 wherein said stabilizer is a colloid.

20. The process of claim 12 wherein said surfactant is a non-ionic surfactant.

21. The process of claim 12 wherein said block copolymer is a pure block copolymer.

22. The process of claim 17 wherein said first stage monomer and said second stage monomer comprise at least one hydrophobic monomer and at least one hydrophilic monomer.